CLAIMS

What is claimed is:

- 1. A recombinant DNA molecule that encodes a polypeptide, module or domain derived from a chalcomycin polyketide synthase (PKS) gene cluster.
- 2. The recombinant DNA molecule of claim 1 that comprises a sequence encoding a chalcomycin polyketide synthase module selected from the group consisting of modules 0 to 7.
- 3. The recombinant DNA molecule of claim 2 that comprises a sequence encoding a chalcomycin polyketide synthase polypeptide selected from the group consisting of ChmGI, ChmGII, ChmGII, ChmGIV, and ChmV.
- 4. The recombinant DNA molecule of claim 1 that comprises a coding sequence for a chalcomycin modifying enzyme.
- 5. The recombinant DNA molecule of claim 4 that comprises a coding sequence for a chalcomycin P450 hydrolase enzyme selected from the group consisting of ChmHI, ChmPI, and ChmPII.
 - 6. A vector that comprises a DNA molecule of claim 1.
 - 7. The vector of claim 6 that is an expression vector.
 - 8. A recombinant host cell comprising the vector of claim 6
- 9. A recombinant host cell comprising a DNA molecule of claim 1 integrated into the cell chromosomal DNA.
 - 10. A chimeric PKS that comprises at least one domain of a chalcomycin PKS.

- 11. A cell comprising the chimeric PKS of claim 10
- 12. A modified functional chalcomycin PKS that differs from the S. bikiniensis chalcomycin PKS by the inactivation of at least one domain of the chalcomycin PKS and/or addition of at least one domain of a non-chalcomycin PKS.
- 13. The modified functional chalcomycin PKS of claim 12, wherein the domain of the chalcomycin PKS or the non-chalcomycin PKS is selected from the group consisting of a loading domain, a thioesterase domain, an AT domain, a KS domain, an ACP domain, a KR domain, a DH domain, and an ER domain.
 - 14. A cell comprising the PKS of claim 12
- 15. A method to prepare an chalcomycin derivative which method comprises providing extender units to the cell of claim 14.
- 16. A recombinant expression system capable of producing a chalcomycin synthase domain in a host cell, said system comprising an encoding sequence for a chalcomycin polyketide synthase domain, and said encoding sequence being operably linked to control sequences effective in said cell to produce RNA that is translated into said domain.
 - 17. A host cell modified to contain a recombinant expression system of claim 16.
 - 18. An isolated polypeptide encoded by a recombinant polynucleotide of claim 1.
- 19. A recombinant host cell comprising a S. bikiniensis chalcomycin PKS polypeptide selected from the group consisting of ChmGI, ChmGII, ChmGIII, ChmGIV, and ChmV.
 - 20. The host cell of claim 19 that is S. fradiae.

- 21. A recombinant S. bikiniensis cell in which a chmGI, chmGII, chmGIII, chmGIV, or chmV is disrupted so as to reduce or eliminate production of chalcomycin.
- 22. A recombinant DNA molecule encoding a first protein comprising one or more modules of a chalcomycin PKS and a second protein comprising one or more modules of a tylosin PKS or spiramycin PKS.
- 23. The DNA molecule of claim 22 wherein the hybrid polyketide synthase comprises one or more polypeptides of a chalcomycin PKS and one or more polypeptides of a tylosin PKS or spiramycin PKS.
- 24. A recombinant host cell comprising a hybrid polyketide synthase comprising one or more modules of a chalcomycin PKS and one or more modules of a tylosin PKS or spiramycin PKS.
- 25. A recombinant DNA molecule, comprising a sequence of at least about 200, optionally at least about 500, basepairs with a sequence identical or substantially identical to a protein encoding region of SEQ ID NO:1.
- 26. The DNA molecule of claim 25 that encodes a polypeptide, module or domain derived from a chalcomycin polyketide synthase (PKS) gene cluster.
- 27. A method of producing a polyketide, which method comprises growing the recombinant host cell of claim 17 or 24 under conditions whereby a polyketide synthesized by a PKS comprising a protein encoded by said recombinant DNA molecule is produced in the cell.
- 28. The method of claim 27 further comprising recovering the synthesized polyketide.
 - 29. The method of claim 28 further comprising chemically modifying said polyketide.

30. The method of claim 28 further comprising formulating said polyketide for administration to a mammal.